



# Roll 'N' Roll Speakers

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## TOOLS:

- [Drill \(1\)](#)  
*optional*
- [Glue \(1\)](#)
- [Hot glue gun \(1\)](#)
- [Marker \(1\)](#)
- [Needle-nose pliers \(1\)](#)
- [Scissors \(1\)](#)
- [Utility knife \(1\)](#)
- [White spray paint \(1\)](#)  
*optional*
- [Wire cutter/stripper \(1\)](#)



## PARTS:

- [Speakers \(2\)](#)
- [Paper or fabric \(1\)](#)  
*decorative, for speaker cover*
- [Fabric tape \(1\)](#)  
*conductive*
- [Tape \(1\)](#)
- [Tilt switch \(1\)](#)  
*nonmetallic*
- [Battery \(1\)](#)
- [Battery connector \(1\)](#)
- [Heat-shrink tubing \(1\)](#)  
*clear*
- [Heat-shrink tubing \(1\)](#)
- [Matboard \(1\)](#)
- [Resistor \(1\)](#)
- [Capacitor \(1\)](#)
- [Capacitor \(1\)](#)
- [Audio amplifier IC \(1\)](#)
- [Trimpot \(1\)](#)

variable resistor

- [Perf board \(1\)](#)
- [Audio plug \(1\)](#)
- [Hook and loop square \(1\)](#)
- [Wire \(1\)](#)

stranded

- [Wire \(variety\)](#)

## SUMMARY

Whether you're at a Bangkok hostel or backpacking in Goa, you can rock out to your favorite tunes with these portable Rock 'n' Roll Speakers, a set of customizable, low-fi travel speakers that allow you to take your music everywhere.

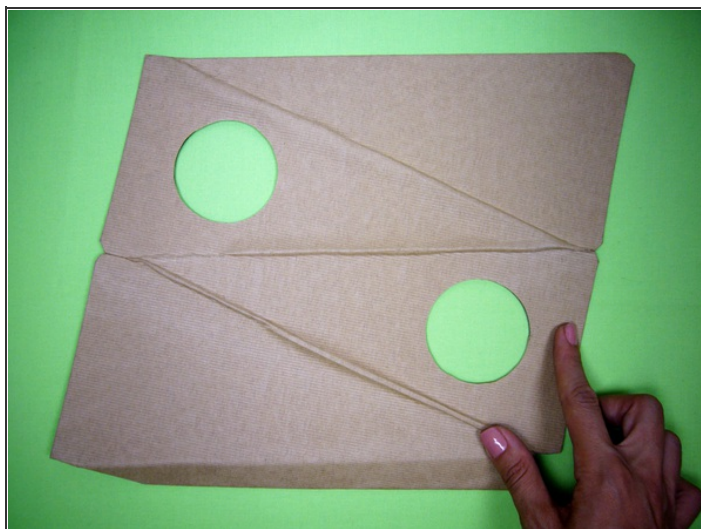
The speakers are driven by a simple power amplifier circuit and a tilt switch. With a simple flip, these portable speakers are switched on and off: when both speakers are visible the speakers are on, and when only one speaker is visible they're off. Powered by a 9V battery, the Rock 'n' Roll Speakers are the perfect compact travel companions for adventurous jet-setters.

### Step 1 — Gather your materials.



- Collect all the tools and materials you need, and clear your workspace.

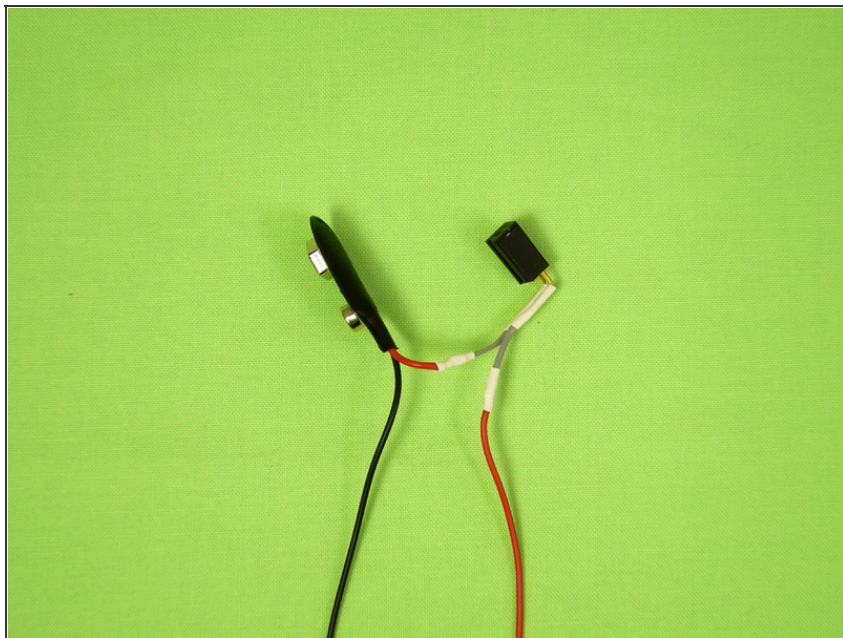
## Step 2 — Make the form.



- Using the template PDF from Files, trace the pattern on mat board, and cut out the form.
- You can optionally customize the speakers by covering the form with decorative paper or fabric. Using the appropriate adhesive for your chosen material, glue it directly on top of the cut form, wrapping the edges into the inside of the form. Fold the form along the score lines.
- Using spray paint, spray the speakers until they are evenly coated.
- If you choose not to cover the form with paper or fabric, you could also paint it.



### Step 3 — Make the switch.



- Cut and strip both ends of two 1½" pieces of stranded wire. Next, cut two 1" pieces of heat-shrink tubing.
- Grab the tilt switch. Wrap one of the stripped ends of a wire onto a switch lead, and solder. Slip the heat-shrink tubing over the connection. Using a heat gun or blow dryer, shrink the tubing. Repeat for the second lead. Then cut the positive, red wire of the connector ½" from the top. Strip the cut ends.
- Next, cut two ¼" pieces of heat-shrink tubing. Slip the pieces of heat-shrink over one of the switch wires. Twist the 2 wires from the switch and battery connector together and solder. Slip the tubing over the connection and shrink. Repeat, connecting the second switch wire to the loose, cut wire from the battery connector.

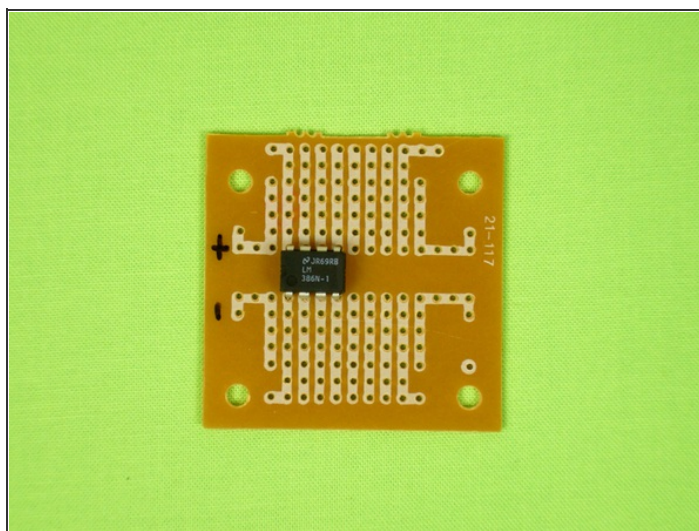
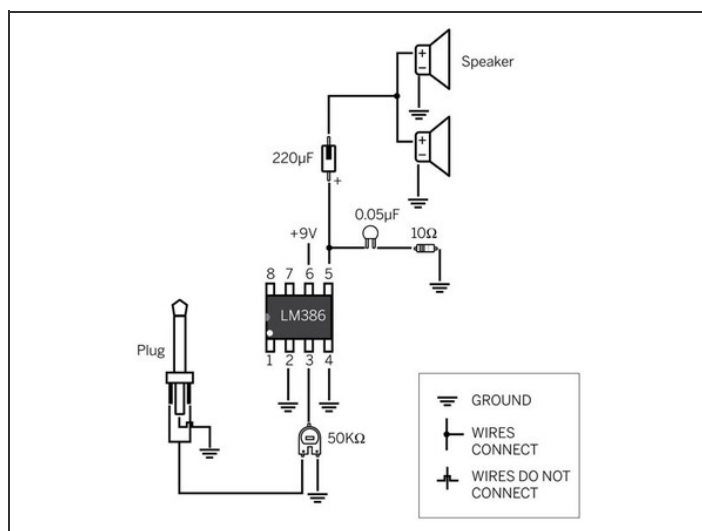
### Step 4 — Make the plug.



- Cut and strip both ends of three 16" pieces of stranded wire. Twist the ends.
- Remove the audio plug cover. Slip the wires through the right, left, and center terminals of the plug and twist them into place. Solder.
- Cut two 1" pieces of heat-shrink tubing. Slip them over the right and left terminals and shrink.
- Using a black marker, mark the bottom of the wire leading from the center terminal. This will be the ground wire. Slip clear ¼"-diameter heat-shrink tubing over all 3 wires. Do not shrink. Replace the plug cover.

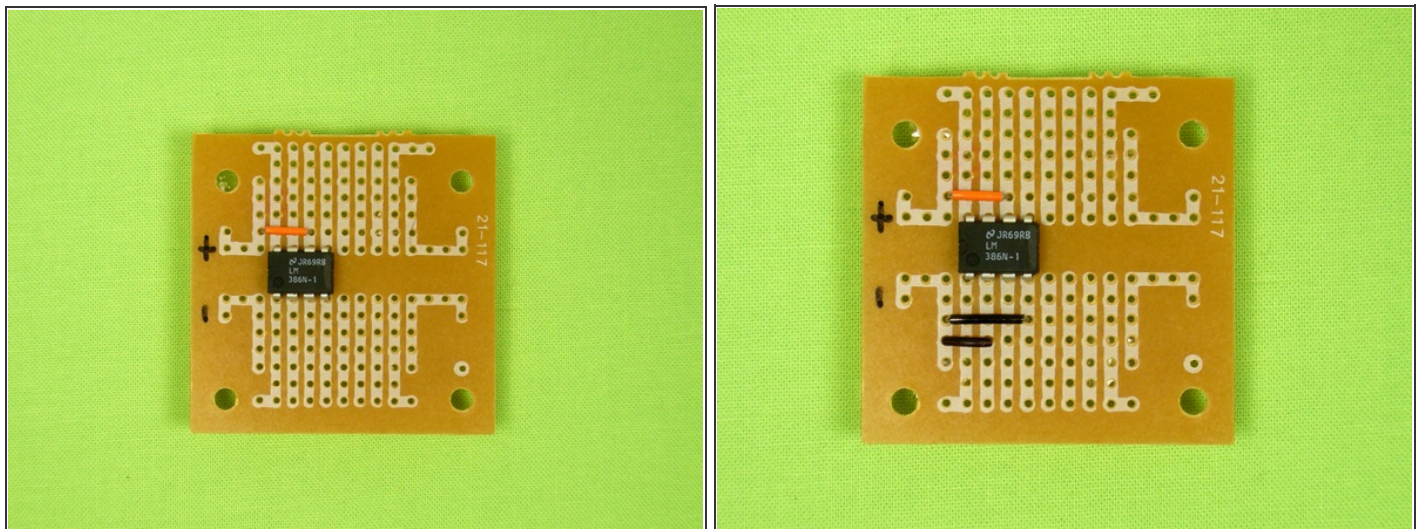


## Step 5 — Get the circuit schematic.



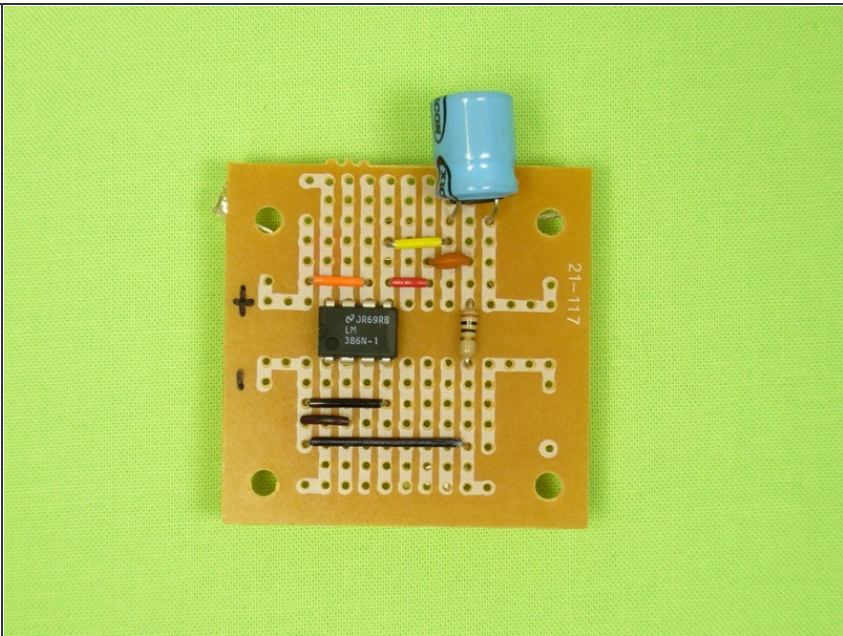
- If you've never built a circuit on a perforated board before, go to <http://www.craftzine.com/07/speakers> for a link to more detailed information on how to use a perf board.
- The illustration shows how the components of the circuit are connected to each other. You can download a PDF of the schematic under Files.
- This schematic is not a direct translation of how the circuit will be played out on the perforated board.



**Step 6 — Build the circuit.**

- Grab the LM386 audio amplifier IC. Locate the notch and dot. The pins on the IC are numbered starting counterclockwise from the dot, as in the facing illustration. Using a perf board designed with standard IC and component spacing, place the IC in the center of the perf board. Designate a row for power (+) and a row for ground (–) by marking the assigned holes.
- Using jumper wire, connect pin 6 to power, pin 4 to ground, and pin 2 to ground.

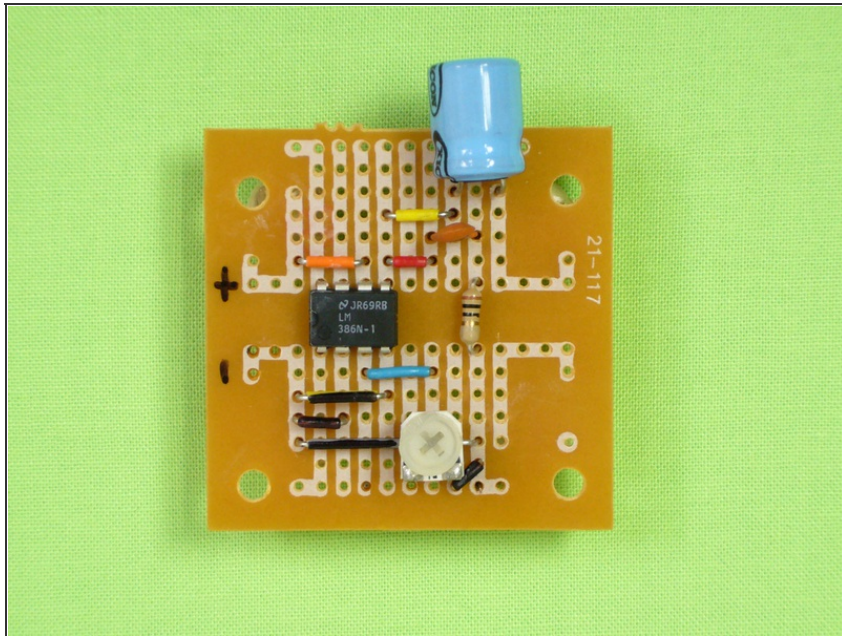
## Step 7



- From pin 5, a  $0.05\mu\text{F}$  capacitor must connect to a  $10\Omega$  resistor, which then has to be grounded. Also from pin 5, a  $220\mu\text{F}$  capacitor must be connected. Connect a wire from pin 5 and jump it 2 rows over (red wire). Connect 1 lead of the  $0.05\mu\text{F}$  capacitor to that row and the other lead 2 rows over.
- To hold the capacitor temporarily in place, bend the leads flush to the bottom of the board. Connect 1 lead of the resistor to the second lead of the  $0.05\mu\text{F}$  capacitor, and the second lead of the resistor to a separate row. Using jumper wire, connect the second lead of the resistor to ground.
- Connect another wire from pin 5 and jump it 3 rows over (yellow wire). Connect the positive lead of the  $220\mu\text{F}$  capacitor (the lead without the black band) to that row, and connect its other lead 2 rows over.

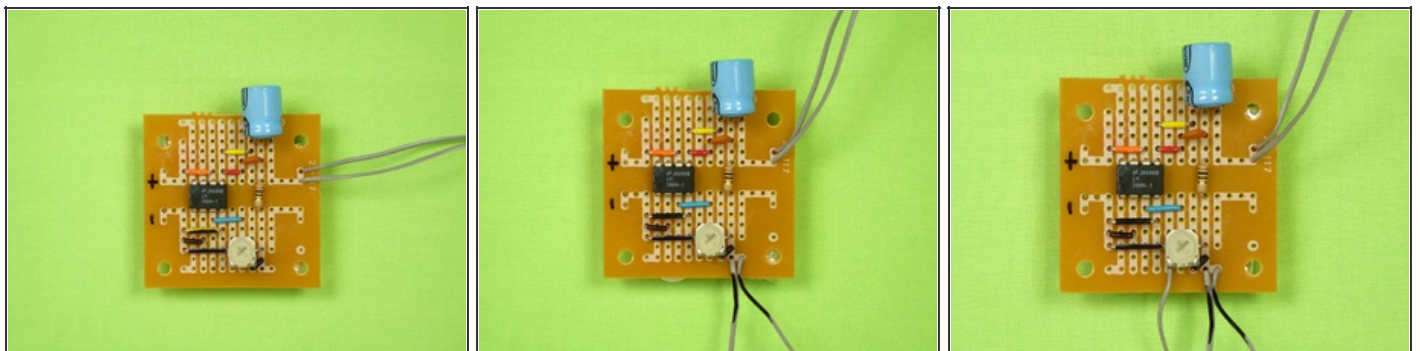


## Step 8



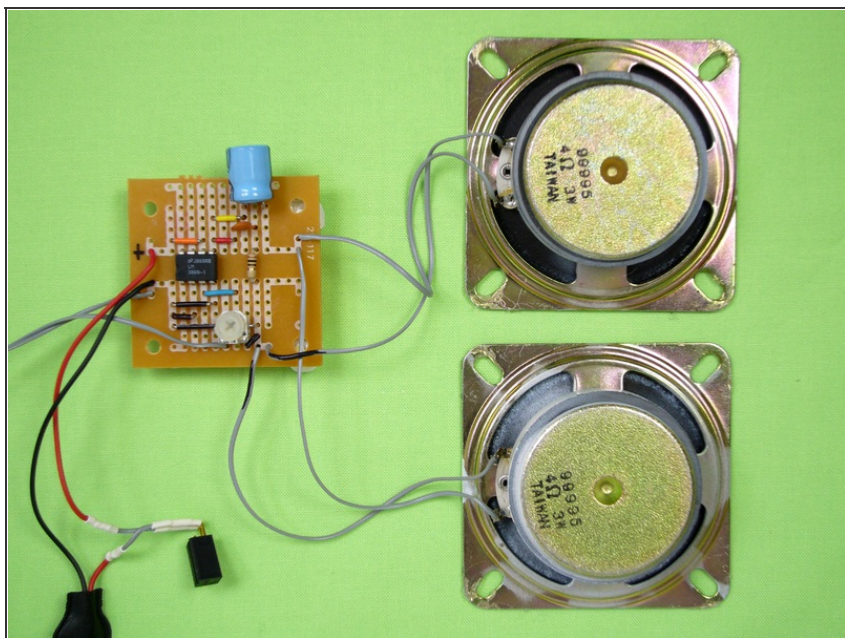
- Ultimately, the middle lead of the 10K trimpot must be connected to pin 3, with one of its outer leads connected to ground while the other is connected to the input of the audio plug.
- Start by connecting a wire from pin 3 and jump it 3 rows over (blue wire). Connect the middle lead of the trimpot to the same row. Connect one of the leads to ground.

## Step 9



- Cut and strip six 8" pieces of stranded wire. Take 2 wires and connect them to the negative lead of the 220 $\mu$ F capacitor. These wires will be the positive wires of the speakers.
- Grab another 2 wires and connect them to ground. Using a black marker, mark these 2 ground wires.
- Next, connect a wire to the second (not grounded) lead of the trimpot. This wire will lead to the plug input.
- Grab the last wire. Connect it to ground. This wire will lead to the grounded side of the audio plug.

## Step 10



- Take the battery connector-switch piece, and insert the red wire into the power row and the negative into ground.
- Now grab the speakers. Slip the positive speaker wires from the board into the positive terminals of the speakers and the negative wires into the negative terminals. Twist, securing them in place.
- Carefully review all connection points in the circuit.
- When everything is connected properly, solder all components into place, and solder the connections at the speaker terminals. Don't solder the audio plug yet — you'll add it later.

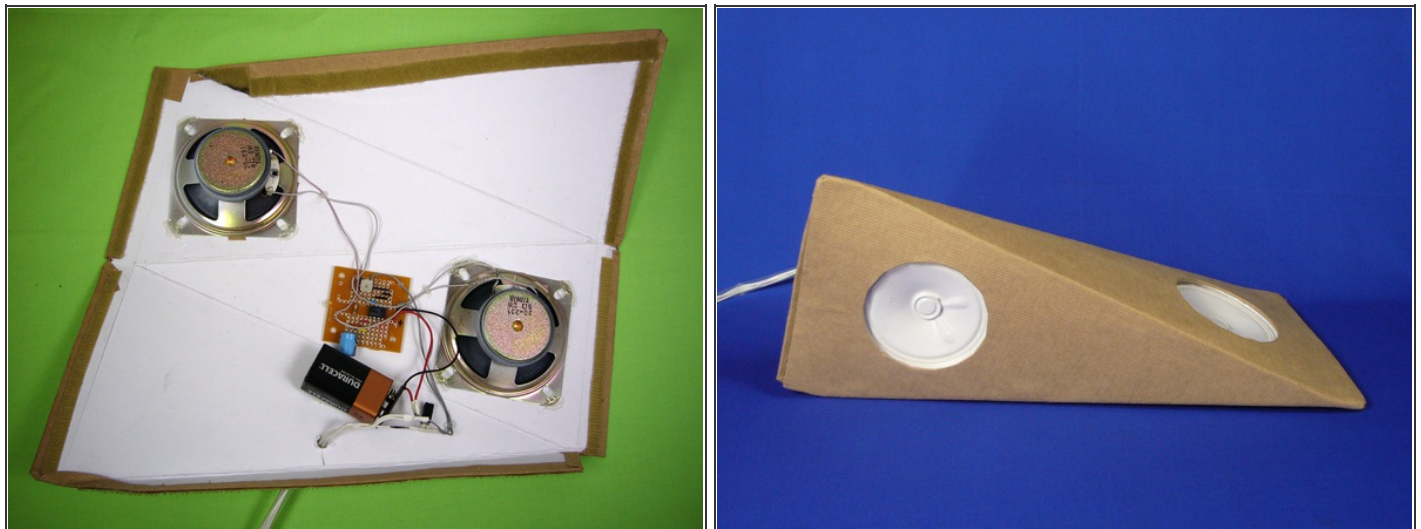
## Step 11 — Attach the speakers and circuit to the form.



- On the form, pierce a hole in the center of the back triangle (the one without the fold). Use a drill if you have one. Next, using hot glue, attach the speakers in place. Position the circuit on the front triangle and glue it securely to the mat board. Slide the plug-wire piece through the drilled hole.
- Cut two 1" pieces of heat-shrink tubing. Slip the heat-shrink over the ground wire of the plug. Wrap the ground wire of the plug to the ground wire coming from the circuit. Solder and shrink the tubing. Repeat for the plug's 2 input wires, attaching both input wires from the plug to the corresponding wire on the trimpot.



## Step 12 — Attach the battery and tilt switch.



- Locate an ideal position for the 9V battery on the top triangle of the form. Using a piece of sticky hook and loop tape, attach the battery to the top triangle. Using hot glue, adhere corresponding strips of hook and loop on opposite ends of the inside of the form and the top of the fold.
- Connect a 9V battery to the battery connector and plug in your portable music player.
- Determine the angle at which the tilt switch switches on. Hot-glue the tilt switch in the appropriate position so that it's "on" when the front of the speaker is facing forward (when you can see both speakers) and "off" when the front speaker is facing down (when you can only see one speaker).

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This project is excerpted from the book [Fashioning Technology](#) by Syuzi Pakhchyan.

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